



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Isotope Biohydrology of an Ephemeral Drainage

Focus Categories: G & G, HYDROL, SW, WS

Keywords: 13, 97, 112, 133, 201

Duration: The project will be conducted over a period of two years, but funding from WRRC is requested for work in the first year only.

FY 1999 Federal Funds: \$13,724

FY 1999 non-Federal Funds: \$25,999 University of Arizona \$46,276 Cochise County

Principal Investigators' Names and University: David Williams, University of Arizona, Tucson, Arizona; David Goodrich, USDA-ARS Southwest Watershed Research Center, Tucson, Arizona and Adjunct Professor, University of Arizona

Congressional District of the University Where the Research is to be Conducted: District 2 & 5

Statement of Critical Regional or State Water Problems

Ephemeral channels are integral components of groundwater/surface water systems in arid basins of the Southwest, yet we have inadequate knowledge of pattern and process relating to water movement through these systems. Specifically, knowledge on transpiration losses from groundwater and soil by dominant woody riparian species and details of recharge in specific ephemeral drainages are lacking. Surface/groundwater models, for example, do not take into account the potential for plant roots to passively redistribute water from groundwater to dry surface soil layers. Passive redistribution of water by plant roots in these riparian systems may have consequences for total evapotranspiration and affect hydrological fluxes at the basin scale. We propose a suite of hydrological and ecophysiological isotope studies at Walnut Gulch in southeastern Arizona to characterize the fate of water moving through a representative ephemeral drainage in a semi-arid region.

Statement of Results or Benefits

Demands on groundwater systems to support urban growth, agriculture, and mining are rising throughout semi-arid and arid regions worldwide. Local, state and federal governments are stipulating that water for human use reach a balance with that needed to sustain natural ecosystem processes and biological diversity. Balancing these demands requires a clear scientific understanding of processes controlling hydrologic fluxes into and out of the groundwater system.

This proposal focuses on a relatively understudied component of semi-arid and arid watersheds - the ephemeral channel - which potentially contributes significantly to the groundwater balance of arid and semi-arid basin systems. This proposal takes a multi-disciplinary approach and attempts to relate biological controls on evapotranspiration to processes of groundwater recharge. Specifically, results from this investigation will shed light on the magnitude and timing of deep recharge from ephemeral channels to the upper San Pedro watershed aquifer. Local, State, and Federal policy, guidelines, and recommendations regarding effective management of this watershed will take into account specifics of our findings.